CLAIMS

What is claimed is:

1   1.   A method for performing spoken language translation, comprising:

2   receiving at least one speech input comprising at least one source

3 language;

4   recognizing at least one source expression of the at least one source

5 language;

6   translating the recognized at least one source expression from the at

7 least one source language to at least one target language;

8   synthesizing at least one speech output from the translated at least one

9 target language; and

10   providing the at least one speech output.

1   2.   The method of claim 1, further comprising minimizing

2 misrecognitions of the at least one source expression, wherein the

3 misrecognitions result from factors selected from the group comprising noise

4 and speaker variation.

1   3.   The method of claim 2, wherein minimizing misrecognitions

2 comprises:

3   generating at least one intermediate data structure, wherein the at least

4   one intermediate data structure comprises at least one word graph and at least

5   one n-best list, wherein the at least one intermediate data structure encodes at

6   least one recognition hypothesis; and

7   generating at least one candidate recognized source expression by

8   processing the at least one intermediate data structure using at least one

9   model, wherein the at least one model is a model selected from the group

10   comprising a general language model and a domain model.

1   4.   The method of claim 3, further comprising selecting one of the at least

2   one candidate recognized source expressions, wherein the selection is

3   performed using an interface selected from the group comprising at least one

4   graphical user interface and at least one voice command interface.

1   5.   The method of claim 3, further comprising confirming one of the at

2   least one candidate recognized source expressions, wherein the confirmation

3   is performed using an interface selected from a group comprising at least one

4   graphical user interface and at least one voice command interface.

1   6.   The method of claim 1, wherein the at least one speech input

2   comprises natural spoken language, wherein the natural spoken language

3   comprises at least one word, at least one phrase, and at least one sentence.

1   7.   The method of claim 1, further comprising:

2   detecting at least one meaning of the at least one speech input, wherein

3   the at least one meaning comprises statements and questions; and

4   rendering the at least one meaning in the synthesized at least one

5   speech output.

1   8.   The method of claim 1, wherein translating comprises:

2   performing morphological analysis of the recognized at least one

3   source expression using at least one source language dictionary and at least

4   one source language morphological rule;

5   generating at least one sequence of analyzed morphemes;

6   performing syntactic source language analysis using grammar rule-

7   based processing and example-based processing;

8   generating at least one source language syntactic representation based

9   on the source language analysis; and

10   performing source language to target language transfer using at least

11 one example database and at least one thesaurus, wherein the morphological

12 analysis and the syntactic source language analysis are independent of the

13 transfer and a domain.

1   9.   The method of claim 8, further comprising:

2   generating at least one target language syntactic representation;

3   performing target language syntactic generation using at least one set of

4   target language syntactic generation rules;

5   generating at least one sequence of target language morpheme

6   specifications; and

7   performing target language morphological generation using at least

8   one target language dictionary and at least one set of target language

9   morphological generation rules.

1   10.   The method of claim 8, wherein the grammar rule-based processing

2   comprises:

3   syntactic and morphological analysis in the at least one source

4   language; and

5   syntactic and morphological generation in the at least one target

6   language.

1   11.   The method of claim 8, wherein the example-based processing

2   comprises performing the transfer from the at least one source language to

3   the at least one target language using an example database, wherein the

4   example database comprises at least one stored pair of corresponding

5   expressions in the at least one source language and the at least one target

6   language.

1   12.   An apparatus for spoken language translation comprising:

2   at least one processor;

3   an input coupled to the at least one processor, the input capable of

4   receiving speech signals comprising at least one source language, the at least

5   one processor configured to translate the received speech signals by,

6   recognizing at least one source expression of the at least one

7   source language;

8   translating the recognized at least one source expression from

9   the at least one source language to at least one target language; and

10   synthesizing at least one speech output from the translated at

11   least one target language;

12   an output coupled to the at least one processor, the output capable of

13   providing the synthesized at least one speech output.

1   13.   The apparatus of claim 12, wherein the processor is further configured

2   to translate by minimizing misrecognitions of the at least one source

3   expression, wherein the misrecognitions result from factors selected from the

4   group comprising noise and speaker variation.

1   14.   The apparatus of claim 13, wherein the processor is further configured

2   to minimize misrecognitions by:

3   generating at least one intermediate data structure, wherein the at least

4   one intermediate data structure comprises at least one word graph and at least

5 one n-best list, wherein the at least one intermediate data structure encodes at

6 least one recognition hypothesis; and

7 generating at least one candidate recognized source expression by

8 processing the at least one intermediate data structure using at least one

9 model, wherein the at least one model is a model selected from the group

10 comprising a general language model and a domain model.

1 15. The apparatus of claim 14, wherein the processor is further configured

2 to minimize misrecognitions by selecting one of the at least one candidate

3 recognized source expressions, wherein the selection is performed using an

4 interface selected from the group comprising at least one graphical user

5 interface and at least one voice command interface.

1 16. The apparatus of claim 14, wherein the processor is further configured

2 to minimize misrecognitions by confirming one of the at least one candidate

3 recognized source expressions, wherein the confirmation is performed using

4 an interface selected from the group comprising at least one graphical user

5 interface and at least one voice command interface.

1 17. The apparatus of claim 12, wherein the at least one speech input

2 comprises natural spoken language, wherein the natural spoken language

3 comprises at least one word, at least one phrase, and at least one sentence.

1   18.   The apparatus of claim 12, wherein the processor is further configured

2   to translate by:

3   detecting at least one meaning of the at least one speech input, wherein

4   the at least one meaning comprises statements and questions; and

5   rendering the at least one meaning in the synthesized at least one

6   speech output.

1   19.   The apparatus of claim 12, wherein translating comprises:

2   performing morphological analysis of the recognized at least one

3   source expression using at least one source language dictionary and at least

4   one source language morphological rule;

5   generating at least one sequence of analyzed morphemes;

6   performing syntactic source language analysis using grammar rule-

7   based processing and example-based processing;

8   generating at least one source language syntactic representation; and

9   performing source language to target language transfer using at least

10   one example database and at least one thesaurus, wherein the morphological

11   analysis and the syntactic source language analysis are independent of the

12   transfer and a domain.

1   20.   The apparatus of claim 19, wherein translating further comprises:

2   generating at least one target language syntactic representation;

3   performing target language syntactic generation using at least one set of

4   target language syntactic generation rules;

5   generating at least one sequence of target language morpheme

6   specifications; and

7   performing target language morphological generation using at least

8   one target language dictionary and at least one set of target language

9   morphological generation rules.

1   21.   The apparatus of claim 19, wherein the grammar rule-based processing

2   comprises:

3   syntactic and morphological analysis in the at least one source

4   language; and

5   syntactic and morphological generation in the at least one target

6   language.

1   22.   The apparatus of claim 19, wherein the example-based processing

2   comprises performing the transfer from the at least one source language to

3   the at least one target language using an example database, wherein the

4   example database comprises at least one stored pair of corresponding

5   expressions in the at least one source language and the at least one target

6   language.

1   23.   The apparatus of claim 12, further comprising at least one input device

2   selected from the group comprising at least one microphone, at least one

3   keyboard, at least one cursor, and at least one touch-sensitive screen.

1   24.   The apparatus of claim 12, further comprising at least one analog-to-

2   digital converter, at least one digital-to-analog converter, at least one

3   amplifier, and at least one output device selected from the group comprising

4   at least one speaker and at least one display device.

1   25.   A computer readable medium containing executable instructions

2   which, when executed in a processing system, causes the system to perform a

3   method for spoken language translation, the method comprising:

4   receiving at least one speech input comprising at least one source

5   language;

6   recognizing at least one source expression of the at least one source

7   language;

8   translating the recognized at least one source expression from the at

9   least one source language to at least one target language;

10   synthesizing at least one speech output from the translated at least one

11   target language; and

12   providing the at least one speech output.

1 26.   The computer readable medium of claim 25, wherein the method

2 further comprises minimizing misrecognitions of the at least one source

3 expression, wherein the misrecognitions result from factors comprising noise

4 and speaker variation.

1 27.   The computer readable medium of claim 26, wherein minimizing of

2 misrecognitions comprises:

3   generating at least one intermediate data structure, wherein the at least

4 one intermediate data structure comprises at least one word graph and at least

5 one n-best list, wherein the at least one intermediate data structure encodes at

6 least one recognition hypothesis; and

7   generating at least one candidate recognized source expression by

8 processing the at least one intermediate data structure using at least one

9 model, wherein the at least one model comprises a general language model

10 and a domain model.

1 28.   The computer readable medium of claim 27, wherein the method

2 further comprises selecting one of the at least one candidate recognized source

3 expressions, wherein the selection is performed using an interface comprising

4 at least one graphical user interface and at least one voice command interface.

1 29.   The computer readable medium of claim 27, wherein the method

2 further comprises confirming one of the at least one candidate recognized

3   source expressions, wherein the confirmation is performed using an interface

4   comprising at least one graphical user interface and at least one voice

5   command interface.

1   30.   The computer readable medium of claim 25, wherein the at least one

2   speech input comprises natural spoken language, wherein the natural spoken

3   language comprises at least one word, at least one phrase, and at least one

4   sentence.

1   31.   The computer readable medium of claim 25, wherein the method

2   further comprises:

3   detecting at least one meaning of the at least one speech input, wherein

4   the at least one meaning comprises statements and questions; and

5   rendering the at least one meaning in the synthesized at least one

6   speech output.

1   32.   The computer readable medium of claim 25, wherein translating

2   comprises:

3   performing morphological analysis of the recognized at least one

4   source expression using at least one source language dictionary and at least

5   one source language morphological rule;

6   generating at least one sequence of analyzed morphemes;

7   performing syntactic source language analysis using grammar rule-

8   based processing and example-based processing;

9   generating at least one source language syntactic representation; and

10   performing source language to target language transfer using at least

11   one example database and at least one thesaurus, wherein the morphological

12   analysis and the syntactic source language analysis are independent of the

13   transfer and a domain.

1   33.   The computer readable medium of claim 32, wherein the method

2   further comprises:

3   generating at least one target language syntactic representation;

4   performing target language syntactic generation using at least one set of

5   target language syntactic generation rules;

6   generating at least one sequence of target language morpheme

7   specifications; and

8   performing target language morphological generation using at least

9   one target language dictionary and at least one set of target language

10   morphological generation rules.

1   34.   The computer readable medium of claim 32, wherein the grammar

2   rule-based processing comprises:

3   syntactic and morphological analysis in the at least one source

4   language; and

5   syntactic and morphological generation in the at least one target

6   language.

1   35.   The computer readable medium of claim 32, wherein the example-

2   based processing comprises performing the transfer from the at least one

3   source language to the at least one target language using an example database,

4   wherein the example database comprises at least one stored pair of

5   corresponding expressions in the at least one source language and the at least

6   one target language.